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Collaborations

A monthly report on collaborative research projects in the northwest Atlantic



Proctor Wells, a fisherman from Phippsburg, Maine, baits a cod trap with a bag of alewives on the deck of his fishing vessel *Tenacious*.

NEC Pilot Project Explores a New Way to Catch Cod

By Michael Crocker

If the Gulf of Maine has a poster-child the codfish must be it. “Wars have been fought over it, revolutions have been spurred by it, national diets have been based on it, economies have depended on it, and the settlement of North America was driven by it. Cod, it turns out is the reason Europeans set sail across the Atlantic, and it is the only reason they could,” according to Mark Kurlansky’s bestseller, *Cod: A Biography of the Fish That Changed the World*.

It is also probably safe to add that the illustrious codfish has been the subject of more scientific inquiry in the waters between Cape Cod and Cape Sable, Nova Scotia than almost any other creature that

breathes with gills. But, despite being the target of at least a 1000-year-old fishery and countless surveys, tagging efforts, and all sorts of high-tech oceanographic gadgetry, there are still only two reliable ways to catch a cod in New England: in a net or on a hook.

Proctor Wells, a lifelong fisherman from Phippsburg, Maine, would like to change that. “If we could find a way to catch cod in a trap, the possibilities would be almost endless,” said Wells. “It would practically eliminate bycatch and bottom damage. It would also create new economic opportunities for near-shore and small-boat fishermen, such as a market for live cod and unregulated species like cusk.”



A plastic “trigger” guards the opening to the five-foot trap

Cod-Traps (continued)

The Northeast Consortium, which was founded in 1999 to encourage and fund research between scientists and fishermen agreed, awarding Wells and Dr. Pingguo He, a fishing gear specialist from the University of New Hampshire, a \$25,000 grant to build and test cod traps.

"In a regulatory environment that limits landings of cod to 500-pounds a day, it is not hard to imagine fishermen catching their limit with only 10 or 20 traps, and do it using a lot less energy [than is required for dragging]," said Dr. He.

Last winter Dr. He and Wells got together to design and build a prototype. Similar to a wire lobster pot, the cod trap is five-feet long by five-feet wide by two-feet high. Fish enter through two circular openings on the sides, which are guarded by plastic, fork-shaped "triggers" that close behind unsuspecting fish.

Unlike lobster gear, the top of the cod trap is covered with six-inch, diamond-shaped fishing twine; when it is resting on the ocean floor, a plastic buoy suspends the canopy of mesh above the trap, allowing sub-legal size fish to swim away. The traps are baited with bags of alewives and tethered to a line and buoy.

Ten traps in all—some using slight variations on the design described above, including a four-foot trap and a couple different kinds of triggers—are also being tested in the waters of eastern Casco Bay.

Cod traps have already been used with varying success in Alaska and Newfoundland but, historically, fishermen have had a more difficult time getting the contraptions to work in the Gulf of

Maine.

According to Dr. He, recent reports of lobstermen catching the daily limit of cod inside their traps inspired him to give cod traps another look. "If they're catching cod while lobstering it seems to make sense that we could find a way to target cod or other groundfish like flounder, sculpin or whatever with a trap as well," he said.

So far the trap's landings in Casco Bay have been meager. "We would have to use traps that caught more fish to make them economically feasible," said Wells. "But the unusually cold winter could be to blame and we also need to experiment with different kinds of baits and configurations."

In fact, Wells is confident enough to have invested his own time and money in the project. And the Maine Technologies Institute (MTI), which was established by the state legislature in 1999 to support research and development of product innovation, has committed \$73,000 for the development and testing of cod traps by Wells and Vincent Balzano (F/V *North Star*), a fisherman from Portland.

"I've never been involved with a project that has generated so much interest," said Wells. "Scientists and fishermen from Gloucester to Downeast Maine have been calling me to check on our progress. Like any new idea, it will require a process of trial and error, but eventually we'll get it."



The author prepares to deploy a four-foot "Neptune" trap off the deck of *F/V Tenacious*.

NEW MAPPING TECHNOLOGY IS BOON TO FISHERIES AND OCEAN RESEARCH

By Michael Crocker

From tracking the journeys of migratory fish to creating three-dimensional maps of the seafloor, computerized mapping systems are emerging as a powerful new tool in oceanography, commercial fishing and marine resource management.

Why? GIS can place many layers of information about the oceans—showing the contours of undersea slopes, salinity, sea temperature gradients, and so forth—on a single color-coded map that allows viewers to spatially analyze almost any kind of information

that can be stored on a computer database, according to Larry Mayer, the director of the Center for Coastal and Ocean Mapping at the University of New Hampshire.

Although Geographical Information Systems, or GIS, has been in use in all manners of scientific analysis for over a decade, new and more powerful computer processors have ratcheted up its capabilities.

For example, it is now possible to take a profile of the ocean floor, gathered by sonar surveys, and overlay it with information about the abundance and distribution of com-

mercially valuable fish. When interfaced with three-dimensional mapping capabilities the resulting image simultaneously shows—in shades of blue, yellow, red and black—the geology of the undersea environment and what kinds of fish tend to congregate there.

GIS (continued)

"Science is about understanding relationships," said Mayer. "New mapping technologies instantaneously show discrete relationships in the oceans that would have taken years for us to notice—if we ever noticed them at all."

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GIS (continued)

Already the maps have been used to study pelagic fish stocks such as albacore tuna and swordfish. And, fisheries researchers have used GIS-based techniques to analyze the interactions of fishing vessels hailing from different ports to assess their combined impacts.

Consider an example of how GIS and 3D imaging technology is being used to manage fisheries on the Pacific Coast. Because the Sustainable Fisheries Act (1996) requires the National Marine Fisheries Service (NMFS) to identify “essential habitat”, scientists in Oregon are integrating data sets describing what kinds of rocks and sediments make up the under-sea environment in their jurisdiction with vessel trip reports (VTRs). The resulting image simultaneously shows where fish are distributed relative to specific marine environments, helping to create a better understanding of where exactly the essential habitat is located.

In New England, geographers from MIT and Rutgers University are using GIS to map the social composition of fishing communities. The purpose of “An Atlas-Based Audit of Fishing Territories, Local Knowledge, and the Potential for Community Participation in Fisheries Science and Management” is to visually show a relationship between fishing communities on land with fishing grounds at sea, according to Kate Albert, a graduate student in geography from Rutgers University who is gathering information for the Atlas Project in Jonesport, Maine.

The \$160,000, multi-year project, funded by the Northeast Consortium, is one of the first fisheries research efforts to harness the power of GIS in order to bring social science data to life. “At base, we want to demonstrate a social landscape at sea,” said Albert.

The Atlas Project uses NMFS trip report data to get a general idea of where fishermen fish. Then, utilizing “community researchers” like Herman “Junior” Backman, a fisherman and community leader from Jonesport, to interview other fishermen and community members, the geographers are able to crosscheck and enhance the NMFS data with local knowledge about the fishery.

GIS technology then combines all of these data sets on a color-coded map. For example, the “probability contour” (shown below) represents the fishing grounds most

likely to be used by fishermen in Gloucester, Mass. on a single, easy-to-read image.

“The database and atlas will provide valuable information for analyses related to management impact assessment, changes in fishing effort, industry profiles by port and many others. And, one very interesting result that has already begun to emerge is to give us a better sense of what it is we mean by community,” said Albert.

Non-government organizations, like the Conservation Law Foundation (CLF) in Boston are also using GIS technology to map habitat that could eventually lead to marine protected areas (MPAs) in the Gulf of Maine.

But for some fishermen, this application of the software brings up an important concern: “It’s great to have all this information available on the same map, but it begs the question: will it be used against us?” said Craig Pendleton, a lifelong fisherman and the coordinating director of NAMA.

“Fishermen will be weary of providing researchers with information about the fishery because years of regulations and legal actions has created a fear that anything we say can and will be used against us; GIS is a great technology but it can also have a down side. It is our responsibility to work through the negatives and use the technology to benefit everyone in the fishery,” said Pendleton.

However, Albert believes that the benefits of fishermen taking ownership of social research like the Atlas Project outweigh the risks.

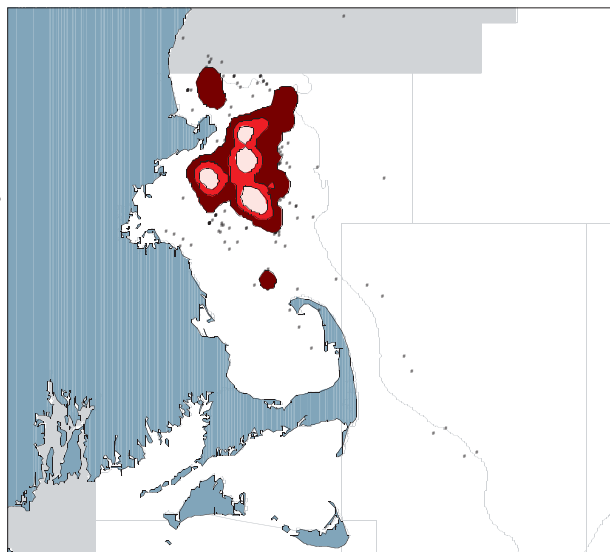
“This is an opportunity

for fishermen to set the record straight about what happens at sea; otherwise their voices will remain silent.”

One thing everyone seems to agree on, however, is that GIS is here to stay and will continue to revolutionize how we understand the oceans.

“Humans respond well to dynamic images,” said Mayer. “GIS transforms what would be rows and rows of tedious information into something enjoyable to look at and interpret.”

The Atlas Project is still seeking participants. Interested parties should contact Kate Albert via email at kalbert@rci.rutgers.edu.



Top: 3-D imaging, courtesy of the CCOM, gives a colorful look at the ocean floor. Increasingly, fisheries research is applying the technology to represent data sets describing the ocean environment. Bottom: Among other data sets, GIS can show where vessels from a particular port are likely to fish at sea. This “probability contour,” courtesy of the Atlas Project, shows areas utilized by the Gloucester fleet.